Claims

1. A method of fabricating a discrete coil, comprising the steps of:

    a) providing a conductor wound in a coil on a tube, said coil having a coil outer surface, said coil outer surface comprising insulation; and

    b) opening a window in said insulation on said coil outer surface to expose conductor of said coil for a contact; and

    c) providing a movable core within said tube for adjusting inductance of said coil.

2. The method as recited in claim 1, wherein said providing a conductor step (a) comprises the step of providing a tube and a wire, said wire comprising conductor and insulation, and winding said wire around said tube.

3. The method as recited in claim 1, wherein said wire comprises two ends, wherein neither of said ends is extended from said coil for contacting.

4. The method as recited in claim 1, further comprising the steps of:
    d) providing a substrate; and
    e) surface mounting said coil to said substrate.

5. The method as recited in claim 4, wherein said substrate comprises a printed circuit board, a ceramic substrate, a flex, or an integrated circuit.

6. The method as recited in claim 4, wherein said surface mounting step (e) comprises the step of electrically connecting conductor exposed in said window in said insulation to said substrate.

7. The method as recited in claim 6, further comprising the step of providing a solder or conductive polymer, wherein said electrical connecting step comprises joining with said solder or said conductive polymer.

8. The method as recited in claim 7, wherein said joining step comprises providing solder paste between said substrate and said conductor exposed in said window and heating to reflow said solder.

9. The method as recited in claim 4, further comprising the step of providing additional electronics on said substrate.

10. The method as recited in claim 9, further comprising the step of connecting said additional electronics to said coil.

11. The method as recited in claim 10, further comprising providing a housing for holding said coil, said substrate, and said additional electronics.

12. The method as recited in claim 11, further comprising the step of hermetically sealing said housing.

13. The method as recited in claim 11, further comprising the step of providing pins for external connection through said housing.

14. The method as recited in claim 11, wherein said coil and additional electronics comprise a sensor.

15. The method as recited in claim 14, wherein said sensor comprises a variable reluctance transducer.

16. The method as recited in claim 14, wherein said sensor is for measuring strain, displacement, acceleration, force, or pressure.

17. The method as recited in claim 14, further comprising the step of providing a circuit to correct for temperature variation.

18. The method as recited in claim 17, wherein said circuit is integrated within said package.

19. The method as recited in claim 17, wherein said circuit is located within signal conditioning electronics separate from said package.

20. The method as recited in claim 9, wherein said additional electronics provides excitation or synchronous demodulation.

21. The method as recited in claim 9, wherein said additional electronics converts an ac waveform from said bridge to a dc voltage.

22. The method as recited in claim 1, further comprising the step of packaging said coil in a hermetic package.

23. The method as recited in claim 1, wherein said step of opening a plurality of windows comprises abrading said insulation, chemically etching said insulation, or laser ablating said insulation.

24. The method as recited in claim 23, wherein in said step of laser ablating said insulation, an excimer laser is used.

25. The method as recited in claim 23, wherein in said step of laser ablating said insulation, each said window in said wire insulation extends over a plurality of wires of said winding.

26. The method as recited in claim 23, wherein said step of laser ablating said insulation comprises ablating a ring shaped window in said wire insulation.

27. The method as recited in claim 1, wherein said insulation comprises polyimide.

28. The method as recited in claim 1, further comprising the step of providing a structure for holding position of core within tube.

29. The method as recited in claim 28, further comprising the step of providing a structure for resetting position of core within tube.

30. The method as recited in claim 29, wherein said structure for resetting position of core within tube comprises an electronically controllable clamp.

31. The method as recited in claim 30, wherein said electronically controllable clamp comprises a shape memory alloy.

32. The method as recited in claim 29, wherein said structure for resetting position of core further comprises a spring so said core can snap to a new position when said clamp is released.

33. The method as recited in claim 1, further comprising the step of dicing through said coil and through said tube to provide a plurality of short coils, each said coil having at least one window in said insulation.

34. A method of fabricating a discrete coil, comprising the steps of:

a) providing a conductor wound in a coil, said coil having a coil outer surface, said coil outer surface comprising insulation; and
b) opening a plurality of windows in said insulation on said coil outer surface to expose conductor of said coil for contacts; and
c) dicing through said coil to provide a plurality of short coils, each said short coil having at least one said window in said insulation.

35. The method as recited in claim 34, wherein said providing a conductor step (a) comprises the step of providing a tube and a wire, said wire comprising conductor and insulation, and winding said wire around said tube.

36. The method as recited in claim 34, wherein said wire comprises two ends, wherein neither of said ends is extended from said coil for contacting.

37. The method as recited in claim 34, further comprising the steps of:
d) providing a substrate; and
e) surface mounting said coil to said substrate.

38. The method as recited in claim 37, wherein said substrate comprises a printed circuit board, a ceramic substrate, a flex, or an integrated circuit.

39. The method as recited in claim 37, wherein said surface mounting step (e) comprises the step of electrically connecting conductor exposed in said window in said insulation to said substrate.

40. The method as recited in claim 39, further comprising the step of providing a solder or conductive polymer, wherein said electrical connecting step comprises joining with said solder or said conductive polymer.

41. The method as recited in claim 40, wherein said joining step comprises providing solder paste between said substrate and said conductor exposed in said window and heating to reflow said solder.

42. The method as recited in claim 37, further comprising the step of providing additional electronics on said substrate.

43. The method as recited in claim 42, further comprising the step of connecting said additional electronics to said coil.

44. The method as recited in claim 43, further comprising providing a housing for holding said coil, said substrate, and said additional electronics.

45. The method as recited in claim 44, further comprising the step of hermetically sealing said housing.

46. The method as recited in claim 44, further comprising the step of providing pins for external connection through said housing.

47. The method as recited in claim 44, wherein said coil and additional electronics comprise a sensor.

48. The method as recited in claim 47, wherein said sensor comprises a variable reluctance transducer.

49. The method as recited in claim 47, wherein said sensor is for measuring strain, or displacement,

50. The method as recited in claim 47, further comprising the step of providing a circuit to correct for temperature variation.

51. The method as recited in claim 50, wherein said circuit is integrated within said package.

52. The method as recited in claim 50, wherein said circuit is located within signal conditioning electronics separate from said package.

53. The method as recited in claim 42, wherein said additional electronics provides excitation or synchronous demodulation.

54. The method as recited in claim 42, wherein said additional electronics converts an ac waveform from said bridge to a dc voltage.

55. The method as recited in claim 34, further comprising the step of packaging said coil in a hermetic package.

56. The method as recited in claim 34, wherein said step of opening a plurality of windows comprises abrading said insulation, chemically etching said insulation, or laser ablating said insulation.

57. The method as recited in claim 56, wherein in said step of laser ablating said insulation, an excimer laser is used.

58. The method as recited in claim 56, wherein in said step of laser ablating said insulation, each said window in said wire insulation extends over a plurality of wires of said winding.

59. The method as recited in claim 56, wherein said step of laser ablating said insulation comprises ablating a ring shaped window in said wire insulation.

60. The method as recited in claim 34, wherein said insulation comprises polyimide.

61. The method as recited in claim 34, further comprising the step of providing a movable core within said tube for adjusting inductance of said coil.

62. The method as recited in claim 61, further comprising the step of providing a structure for holding position of core within tube.

63. The method as recited in claim 62, further comprising the step of providing a structure for resetting position of core within tube.

64. The method as recited in claim 63, wherein said structure for resetting position of core within tube comprises an electronically controllable clamp.

65. The method as recited in claim 64, wherein said electronically controllable clamp comprises a shape memory alloy.

66. The method as recited in claim 63, wherein said structure for resetting position of core further comprises a spring so said core can snap to a new position when said clamp is released.

67. A discrete winding, comprising:

a conductor wound in a coil on a tube, said coil comprising a coil outer surface, said coil outer surface comprising insulation, a window in said insulation exposing said conductor of said coil for a contact to said conductor; and

a movable core within said tube for adjusting inductance of said coil.

68. A clamp comprising an elastic material, a shape memory alloy, and an apparatus for activating said shape memory alloy, wherein when said alloy is activated it changes shape and provides a force on said elastic material to change clamping state.

69. A clamp as recited in claim 68, further comprising a power supply, wherein said shape memory alloy is activated by current from said power supply.

70. A clamp as recited in claim 68, further comprising a spring for restoring a workpiece held by said clamp when said clamping state is changed to open said clamp.

71. A clamp as recited in claim 70, wherein said clamp is for holding peak displacement of a core of a variable reluctance transducer.